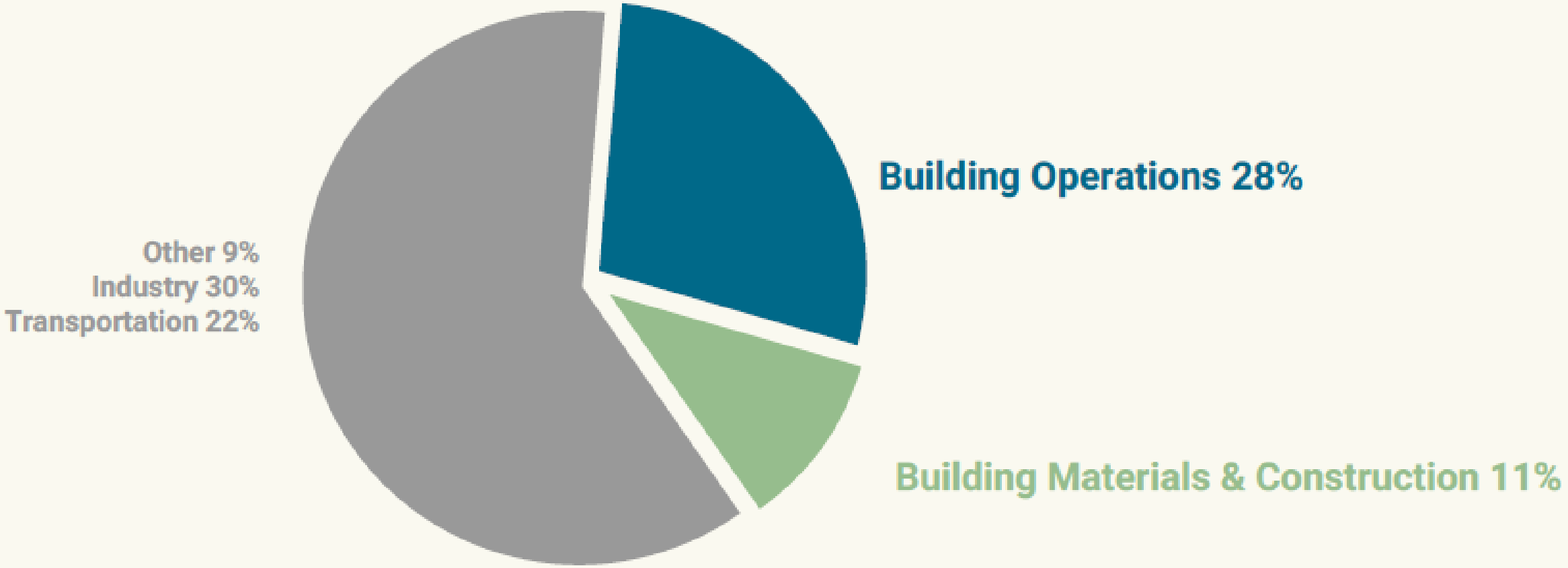
Moran Square, Fitchburg, MA
Low Carbon Historic Retrofit

Rees Larkin Development, TAT, Biome Studio, Petersen Engineering, Building Science Corporation, New Frameworks, Advanced Building Analysis, Keith Construction

Global CO2 Emission by Sector



- Architecture 2030

Decarbonize Moran Square

1. leveraging embodied carbon – existing building
2. operational carbon – PHIUS Passive House & solar
3. low carbon & carbon storing materials


Micron Products, Inc
Sawyer Passway
Boston Coupon Clippers
2A
Sawyer Passway
Myrtle Ave
Main St
Fleetwood
Summer St
Urban Flow La Moda
My Turn


Summer St
Google

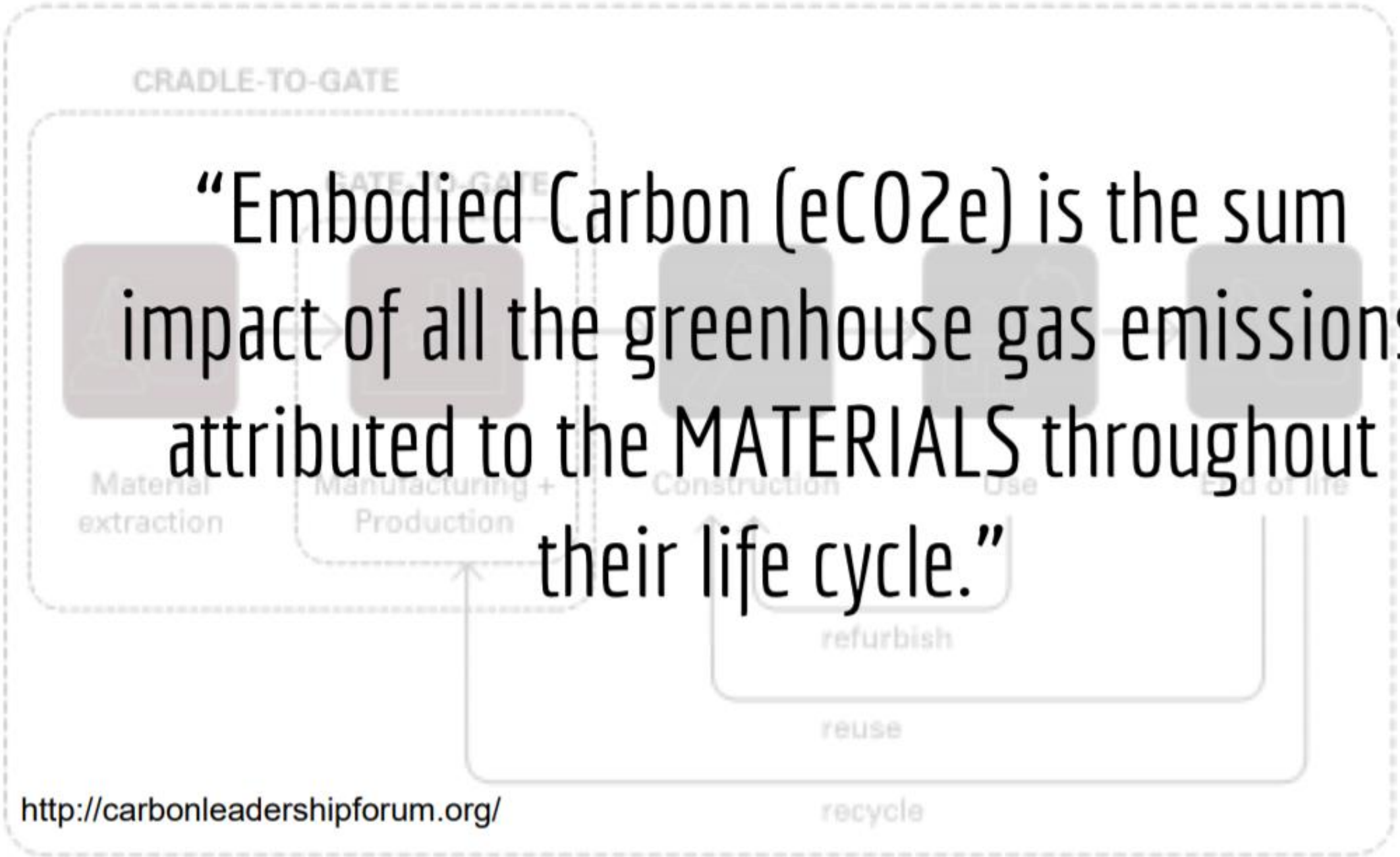

NO
TRESPASSING


MAIN ST
Google


Main St
Fitchburg, Massachusetts
Google
Street View - Sep 2018
10 Main St
Main St
Summer St
Google

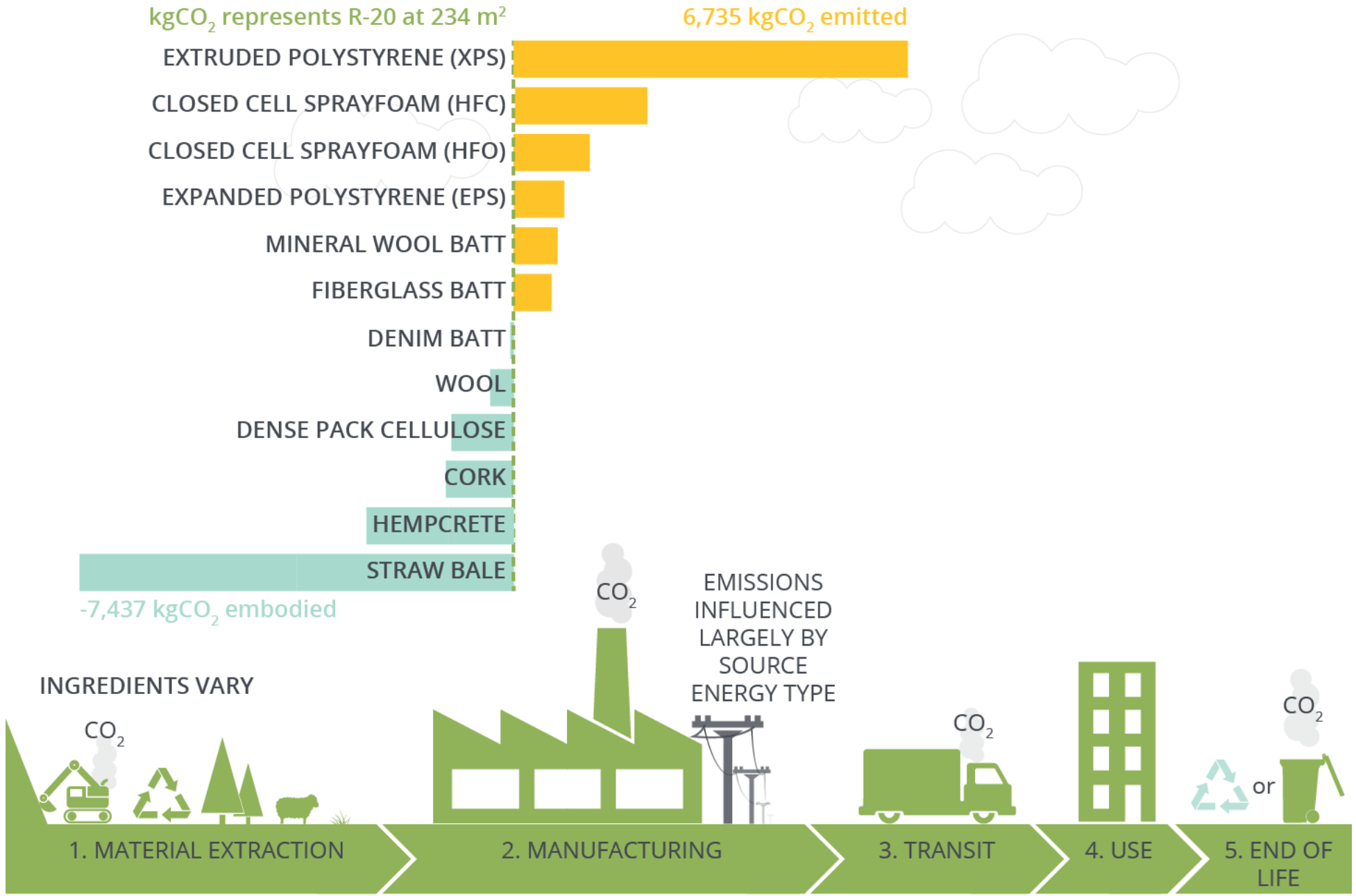
44 units of affordable housing


carbon
storing
materials

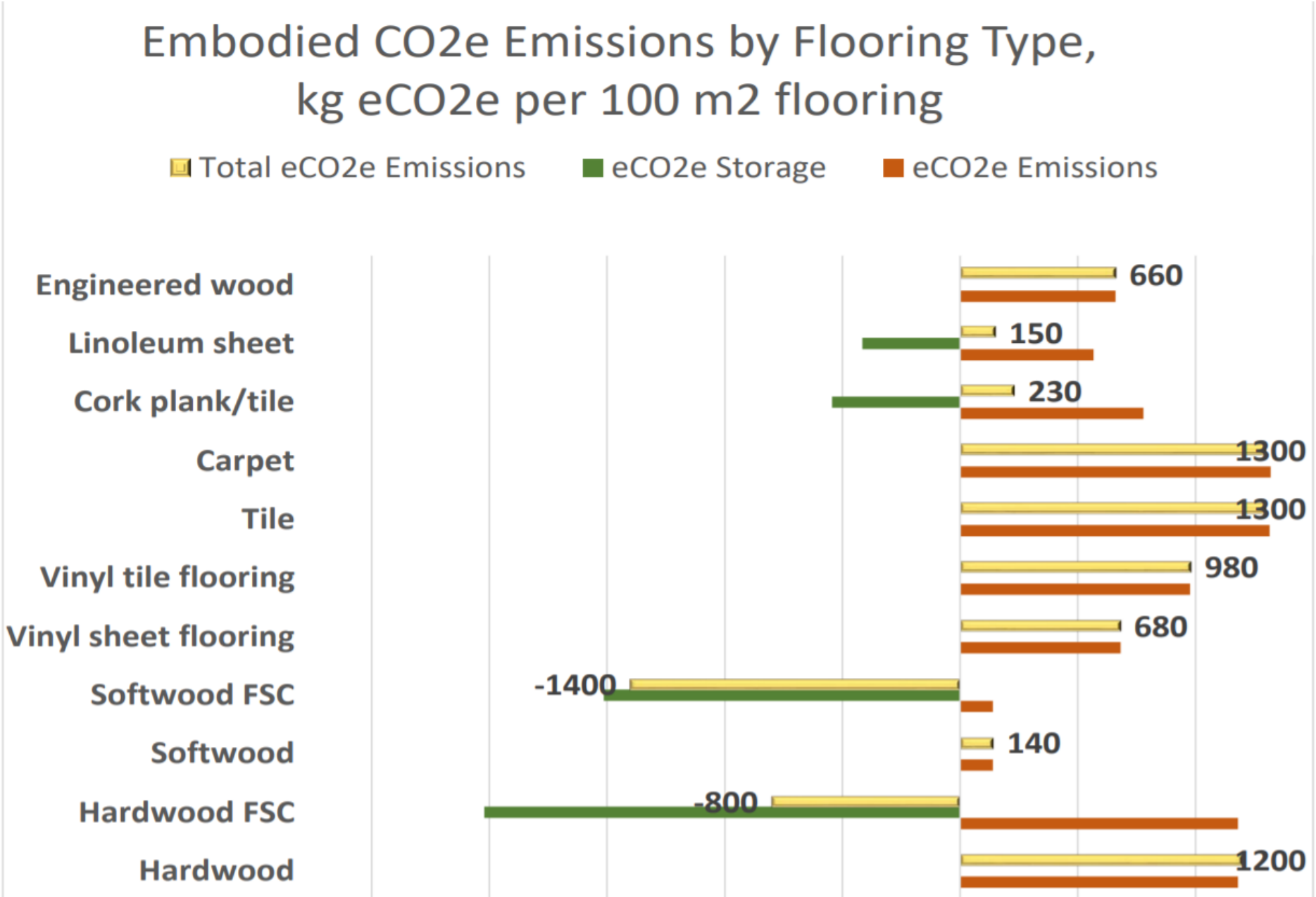


"Embodied Carbon (eCO2e) is the sum impact of all the greenhouse gas emissions attributed to the MATERIALS throughout their life cycle."

CARBON IMPACTS OF INSULATION



Carbon impacts data source: Builders for Climate Action - 2019 White Paper "Low-Rise Buildings as a Climate Change Solution", Chris Magwood, 2019;

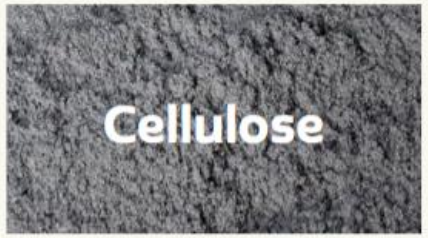


New Frameworks
Low Impact. High Performance.

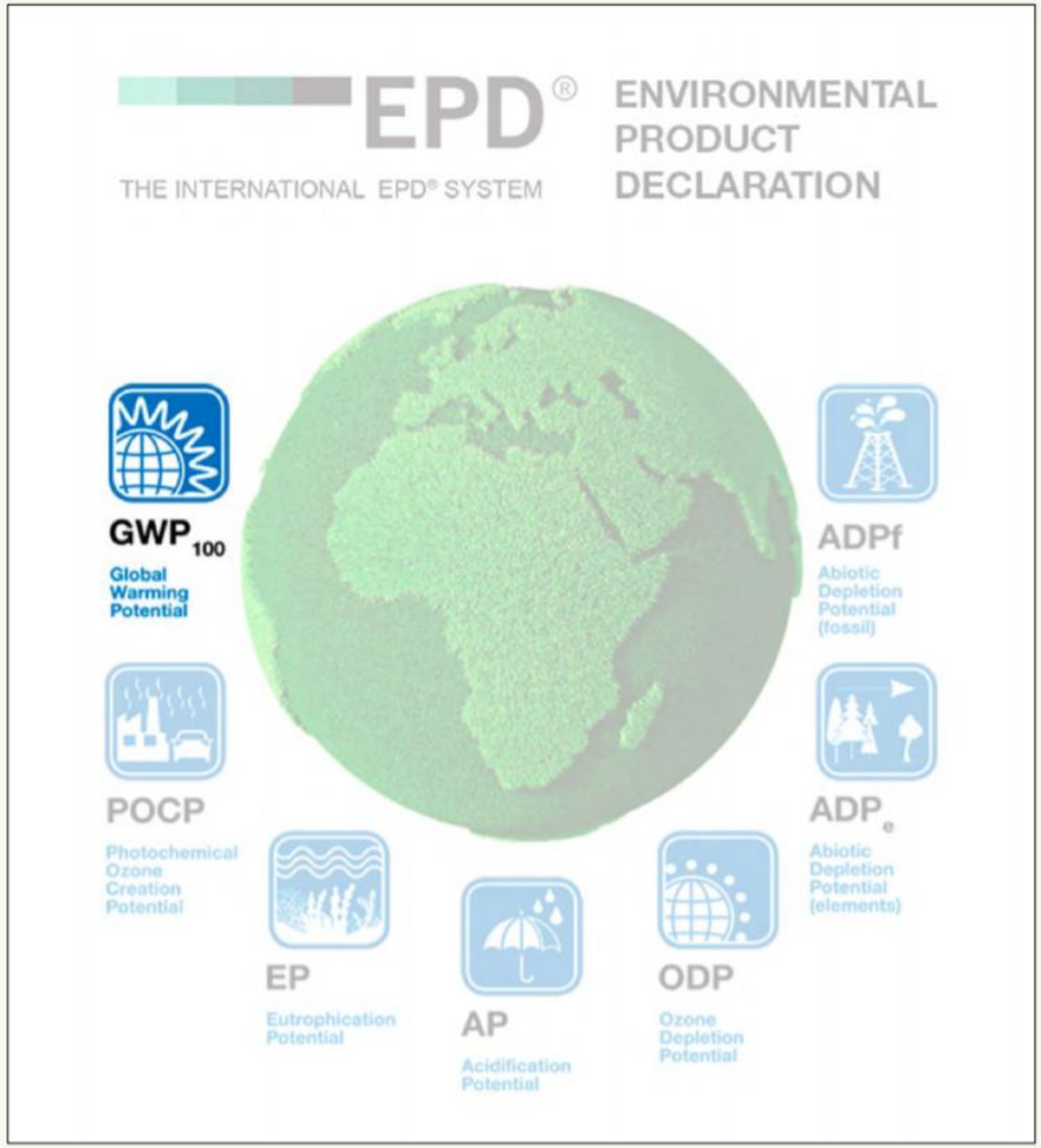
Jacob Deva Racusin +Ace McArleton

Carbon storing materials palette

plant-based, carbon-storing building materials



and no red list chemicals!



Our sources of data:

- Industry average EPD for North America
- Product specific EPD for North America
- Industry average EPD for Europe
- Product specific EPD for Europe
- LCA data from peer reviewed sources
- ICE database


concrete!
8% of global greenhouse gas emissions

Use Less Materials!

Low Carbon Materials

1. **Concrete** – Increase Fly Ash and Reduce Portland

2. **Insulation** – Cellulose, Mineral Wool, Eco-Fiberglass, Glavel, Low HFO Foam

3. **Studs** - Wood Instead of Steel

4. **Flooring** – Reuse wood, Marmoleum, Interface LVT (zero carbon)

5. **Sheetrock** - Ecosmart

cut operational carbon!
PHIUS Passive House + solar

Passive House (PHIUS)

Continuous insulation without thermal bridging

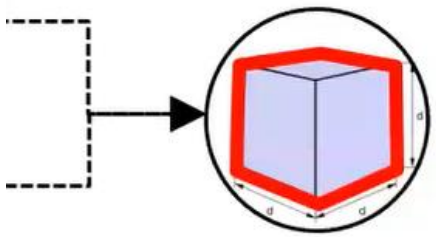
Airtight

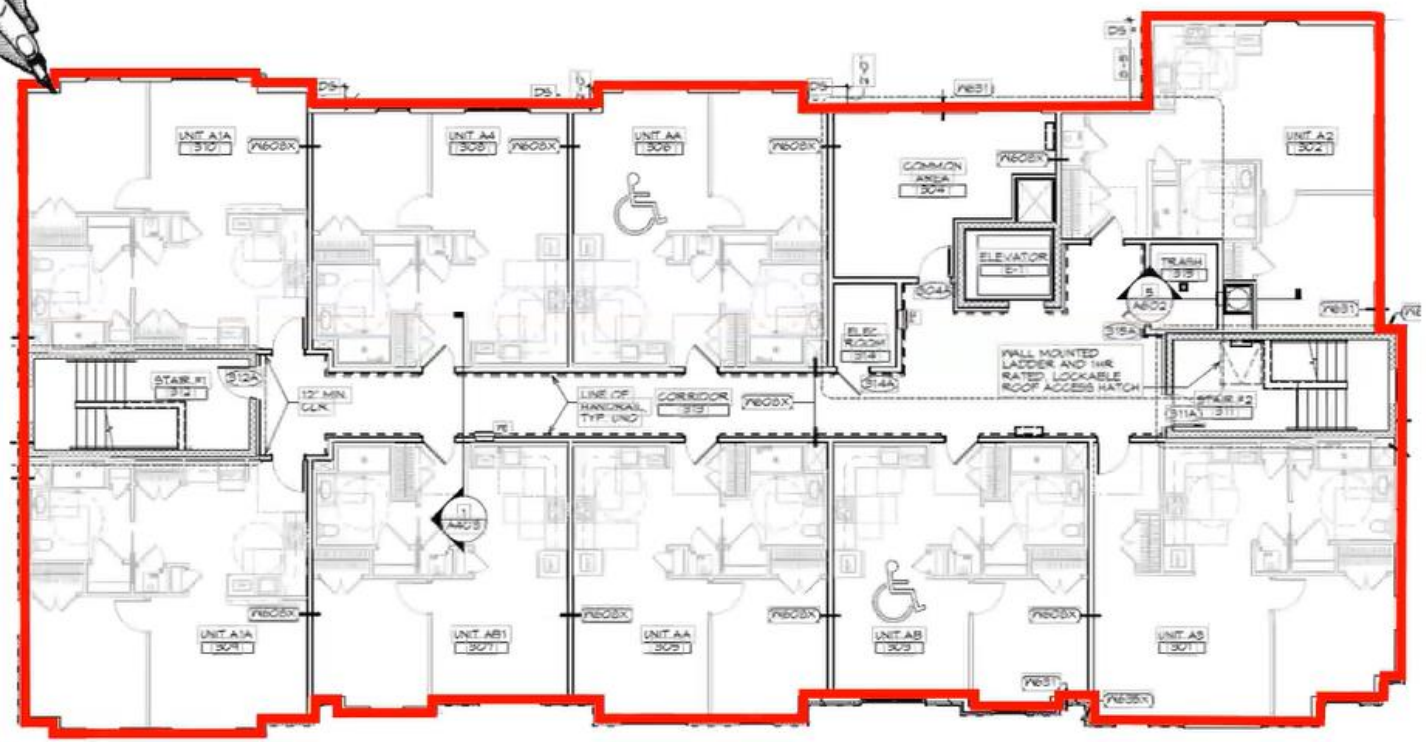
High performance windows & doors

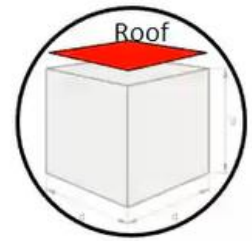
Heat & moisture-recovery ventilation

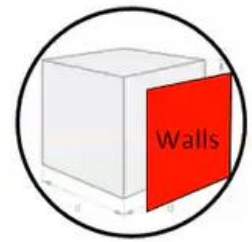
Minimal space conditioning

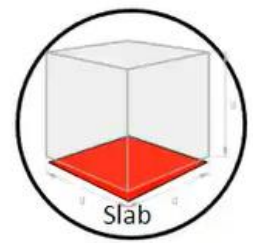
AIR BARRIER



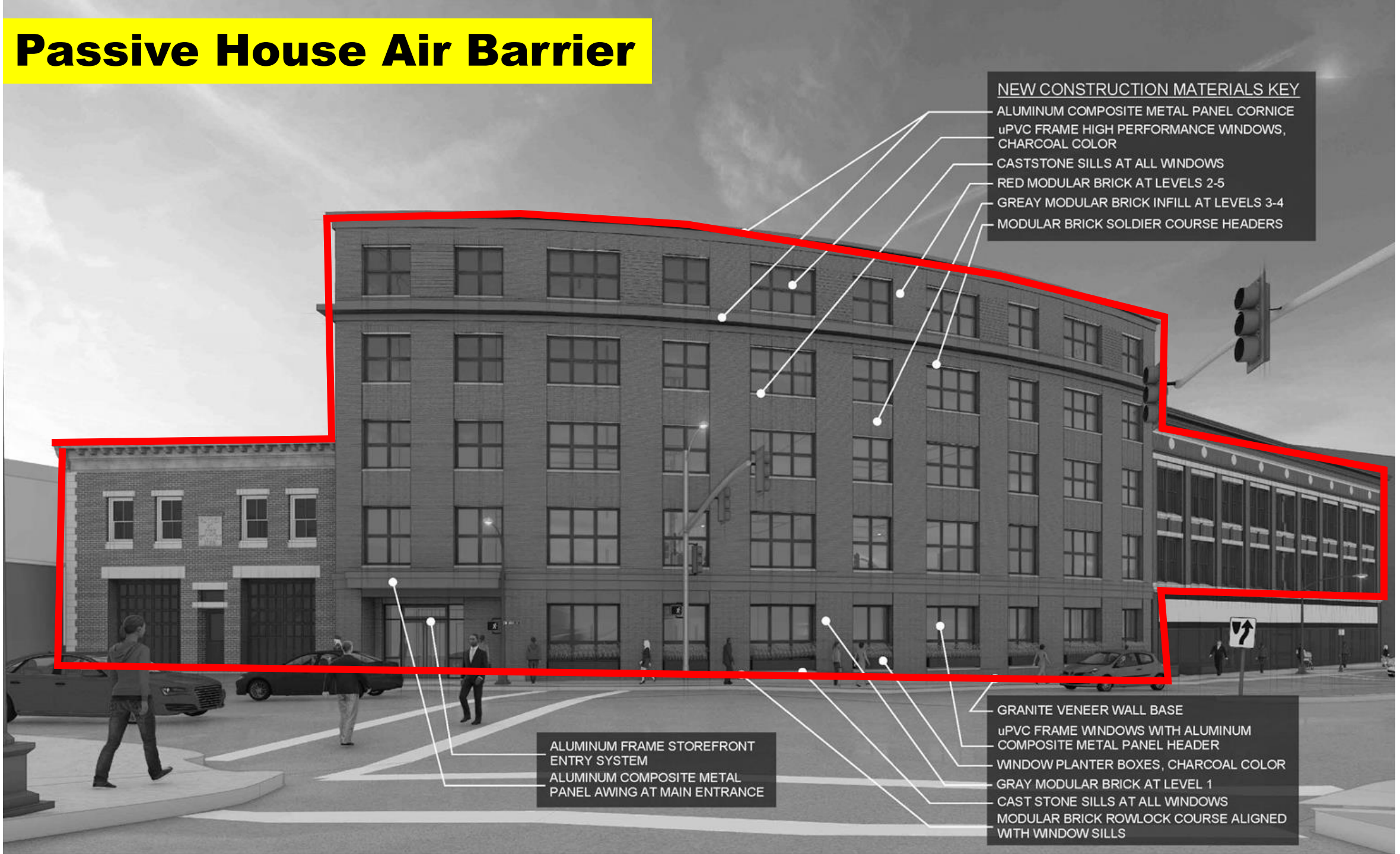

UNIT A1A
UNIT A4
UNIT AA
COMMON AREA
UNIT A2
ELEVATOR
TRASH
ELEC. ROOM
STAIR #1
12" MIN. CLR.
LINE OF HANDRAIL TYP. U.N.O.
CORRIDOR
WALL MOUNTED LADDER AND 1HR RATED, LOCKABLE ROOF ACCESS HATCH
STAIR #2
UNIT A1A
UNIT AB1
UNIT AA
UNIT AB
UNIT A3


Roof


Walls


Slab

Passive House Air Barrier



Federal Historic Tax Credits

Moran Square = Good Candidate for Passive House

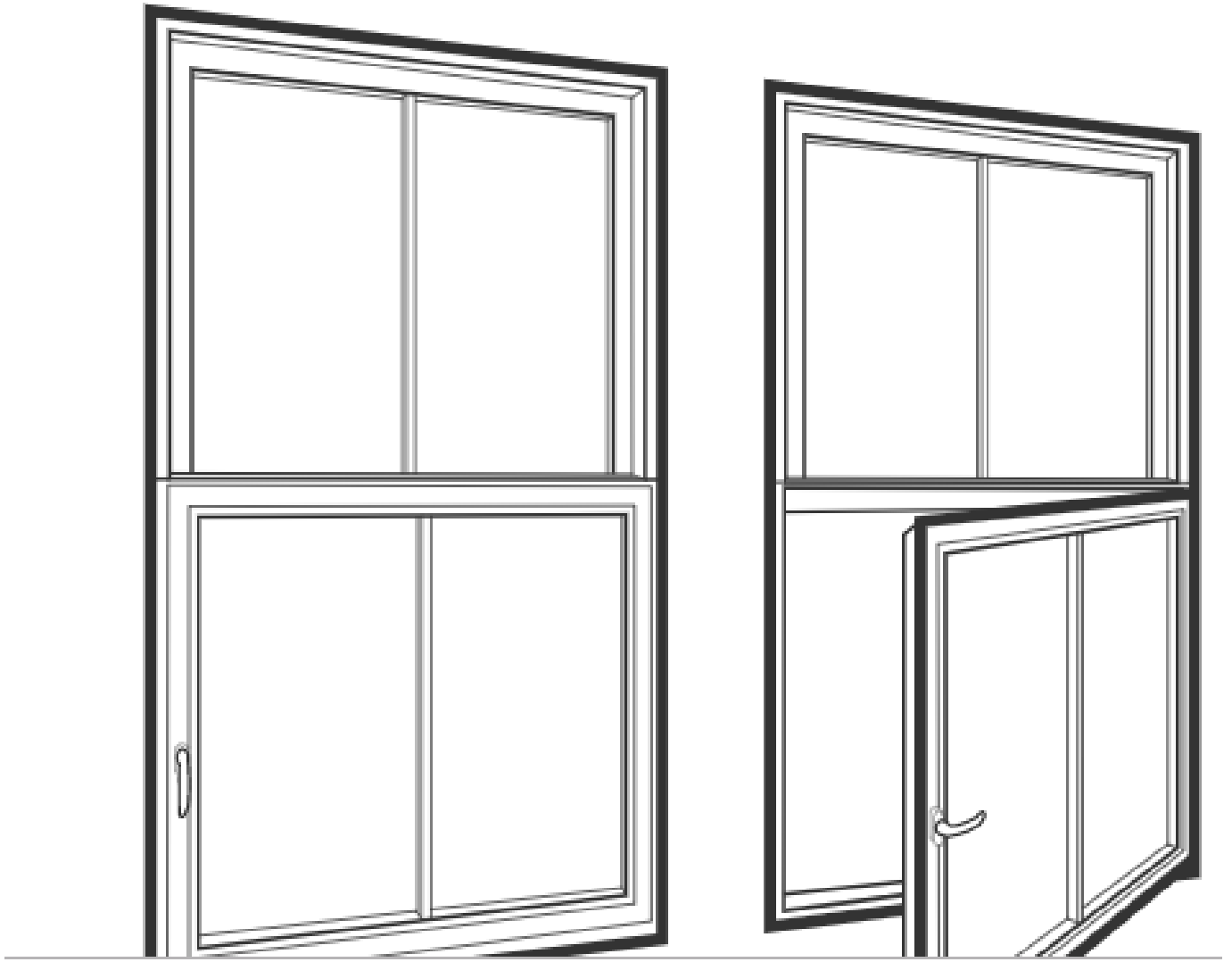
1. simple architecture
2. simple windows
3. limited interior exposed brick

National Park Service Standards and Guidelines

1. Windows!! - Casement to Meet Air Infiltration Goals
2. Wall Section Depth
3. Exposed Brick
4. Thermal Bridges
5. Nothing Visible from the Exterior
6. New Building – Brick Facade

Windows!

Simulated Double Hung Casement Windows! – U < .14

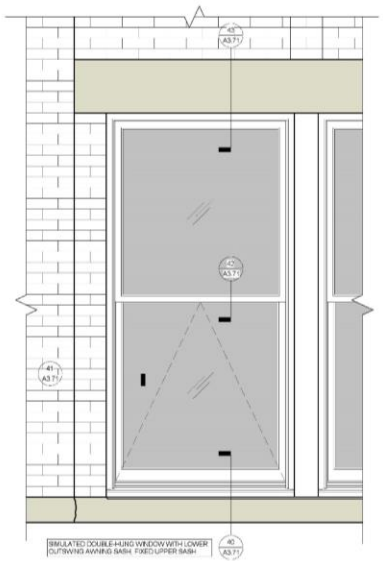


- diagram from Zola

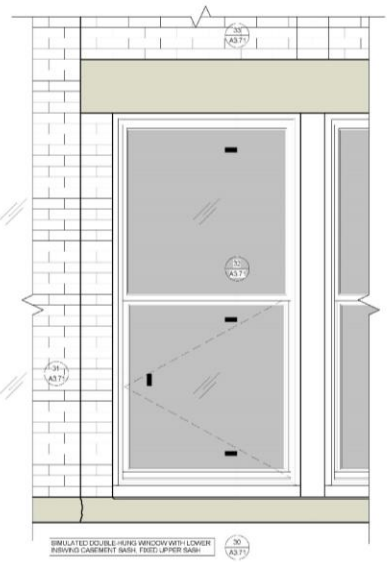
- photo from Zola

National Park Service

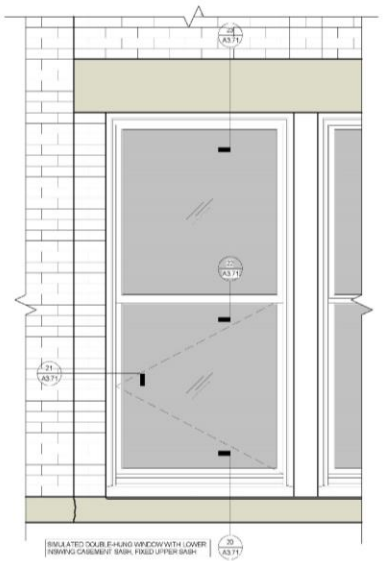
SYNDICATE BLOCK - EXISTING 2ND FLOOR WINDOWS



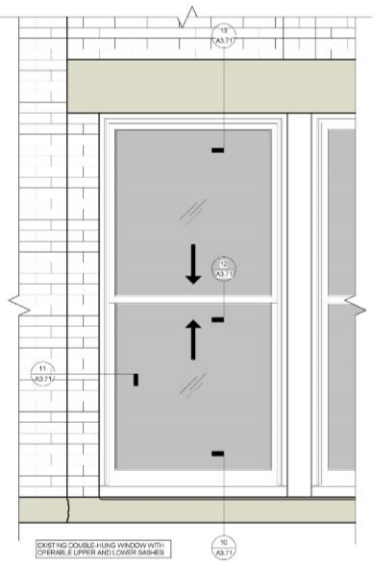
40 SYNDICATE BLOCK - BEWISO KLEOPATRA WINDOW ELEVATION
Scale : 1" = 1'-0"



30 SYNDICATE BLOCK - BEWISO ANNE WINDOW ELEVATION
Scale : 1" = 1'-0"



20 SYNDICATE BLOCK - ZOLA WOOD WINDOW ELEVATION
Scale : 1" = 1'-0"



10 SYNDICATE BLOCK - EXISTING 2ND FLOOR WINDOW ELEVATION
Scale : 1" = 1'-0"

tat

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architecturalteam.com

Consultant:

Revision:

Architect of Record:

Drawn: BW
Checked: GK
Scale: 1" = 1'-0"
Key Plan:

Project Name:
MORAN SQUARE REDEVELOPMENT

15 SUMMER ST & 10 MAIN ST - FITCHBURG

Sheet Name:
EXTERIOR WINDOW ELEVATIONS - SYNDICATE BLOCK

Project Number:
17009

Issue Date:
09/16/19

Sheet Number:
A3.70

9/16/2019 12:36:46 PM
C:_Revit Local 2019\17009_R19_10 Main Street_fwilliamson@HAMT.rvt

Yaro Installation – Mockup

Original Historic Window

Simulated Double Hung Casement Window

Solar Heat Gain Coefficient – Too Reflective!

Better = SHGC .49

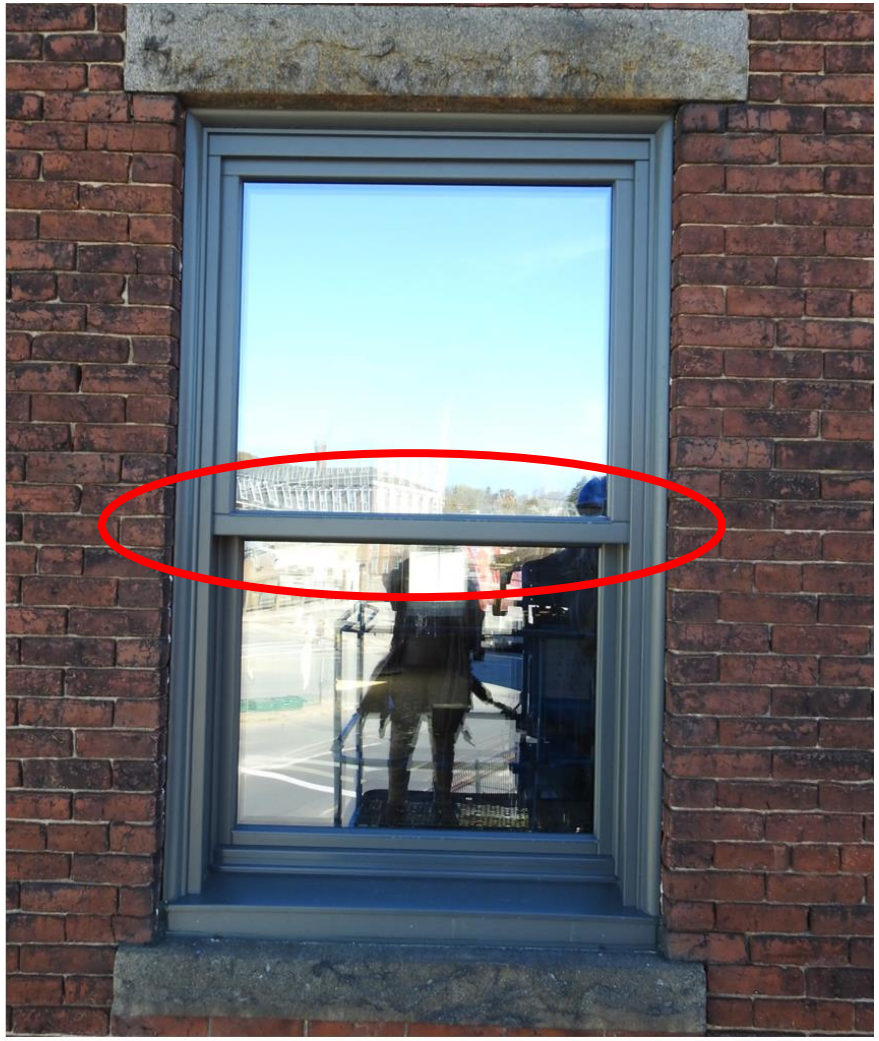
Too Bulky

Installation 1

Installation 2

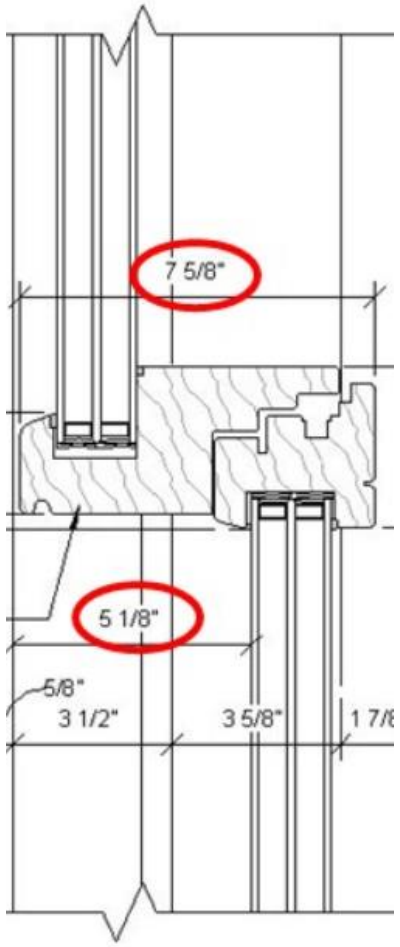
Too Bulky – Meeting Rail Profile

Original Historic Window

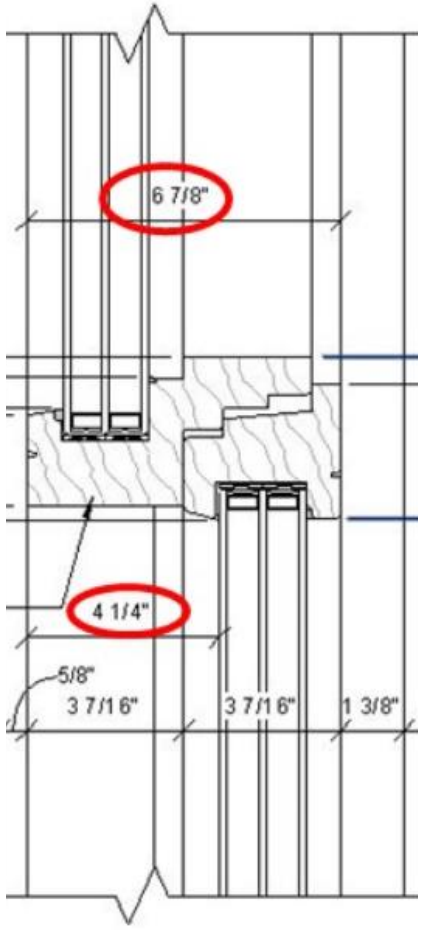


Simulated Double Hung Casement Window

Meeting Rail



Mockup 1



Original Proposal to NPS

wall section depth

Firehouse – Exposed Brick

Firehouse existing conditions – 2nd floor

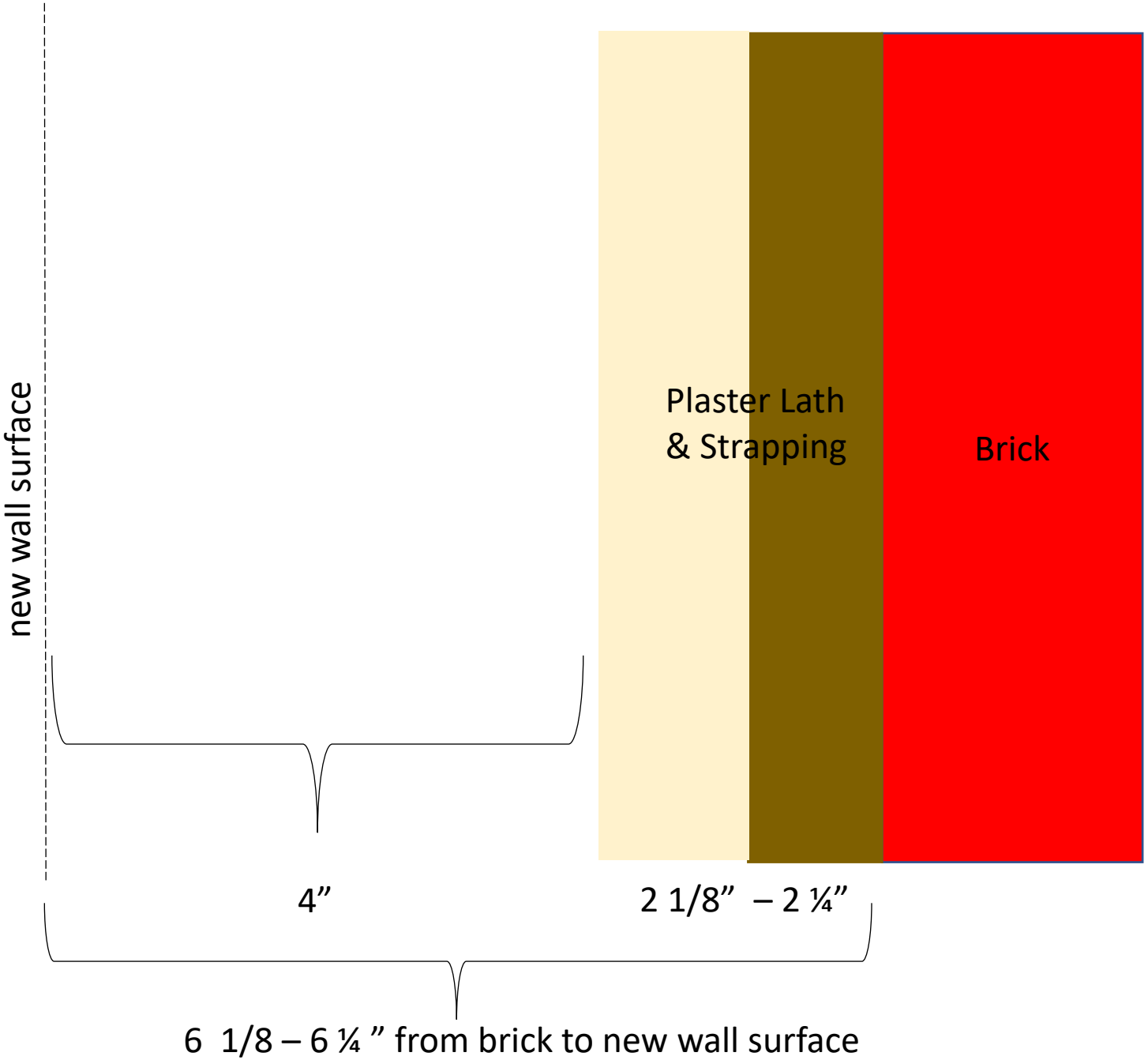
Firehouse Attic

~ 5'6"

Firehouse existing conditions – 2nd floor

Harper Building – Existing Conditions

Harper Building

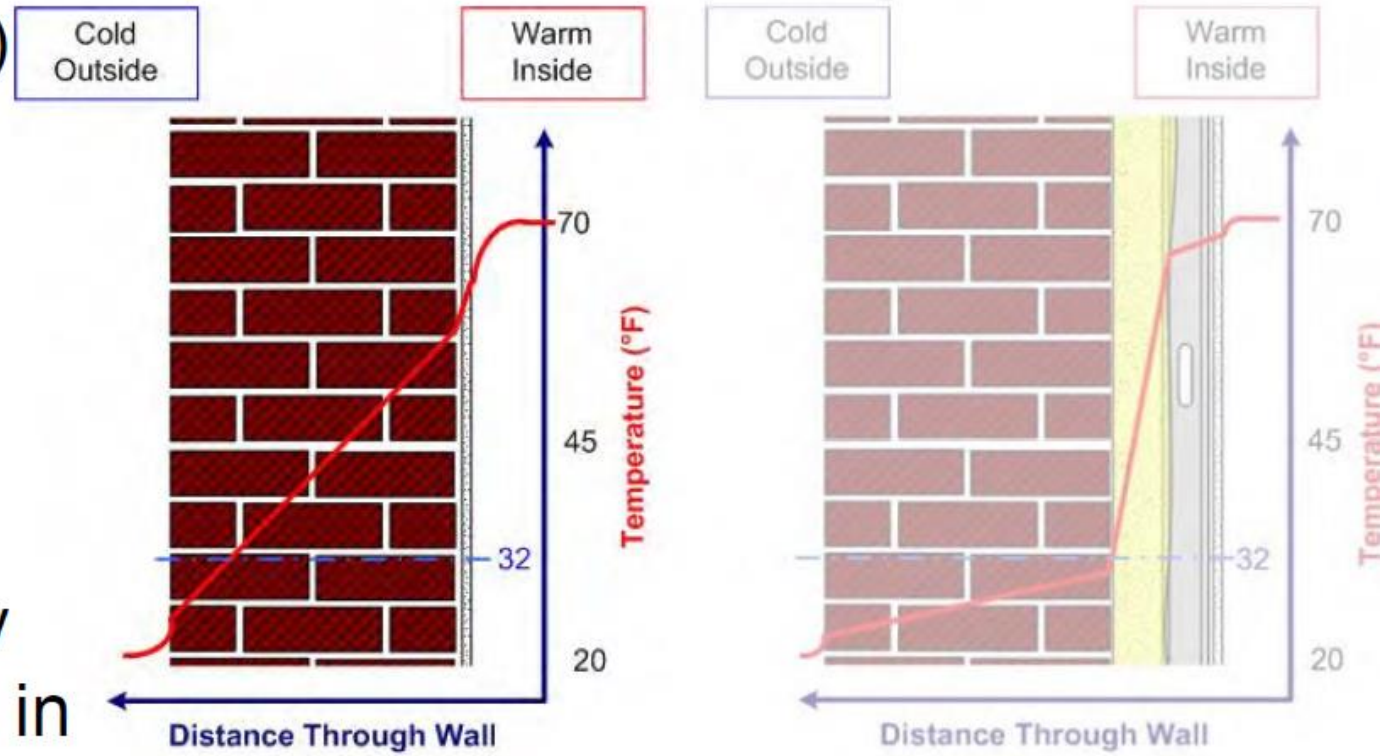


Foam-Free Insulation and Air Sealing

Cold Climate Risks

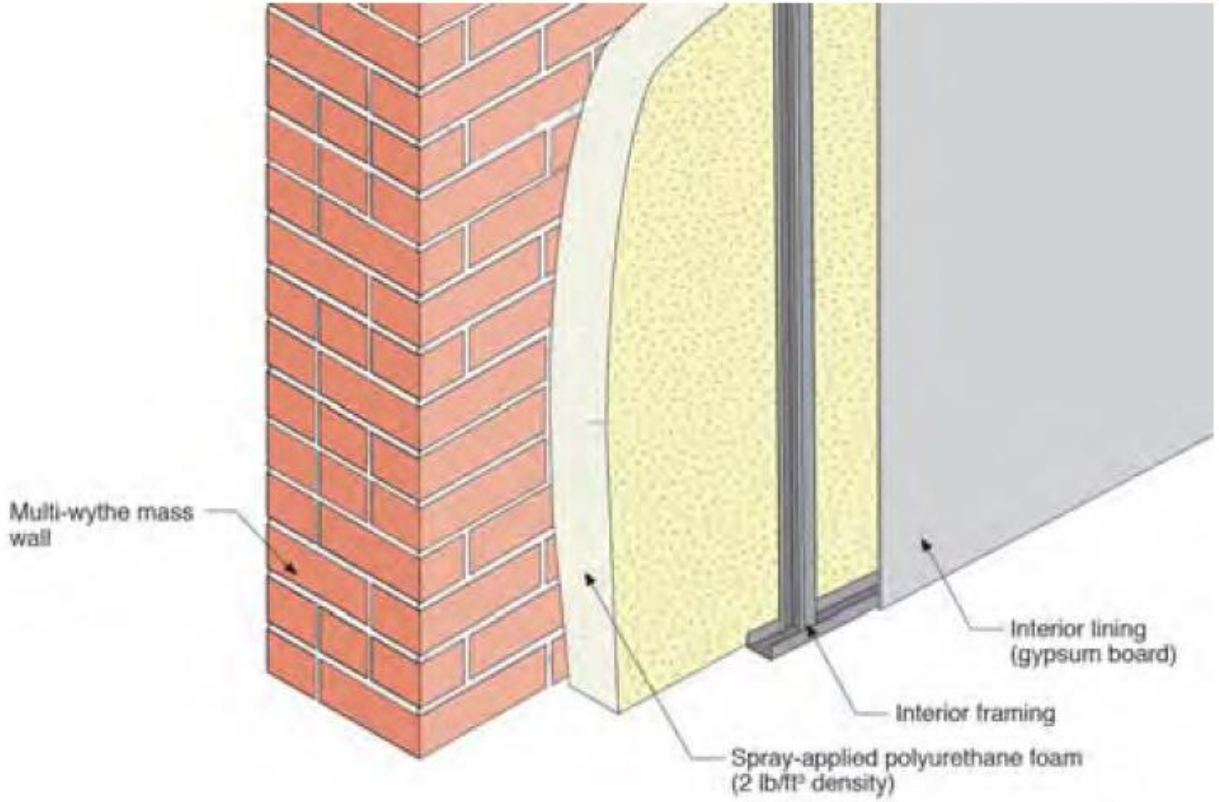
- Freeze-thaw (reduced drying)
- Air leakage condensation on interior face of masonry
- Rot / corrosion of embedded elements

- Covering interior → less early warning of damage problems in the wall

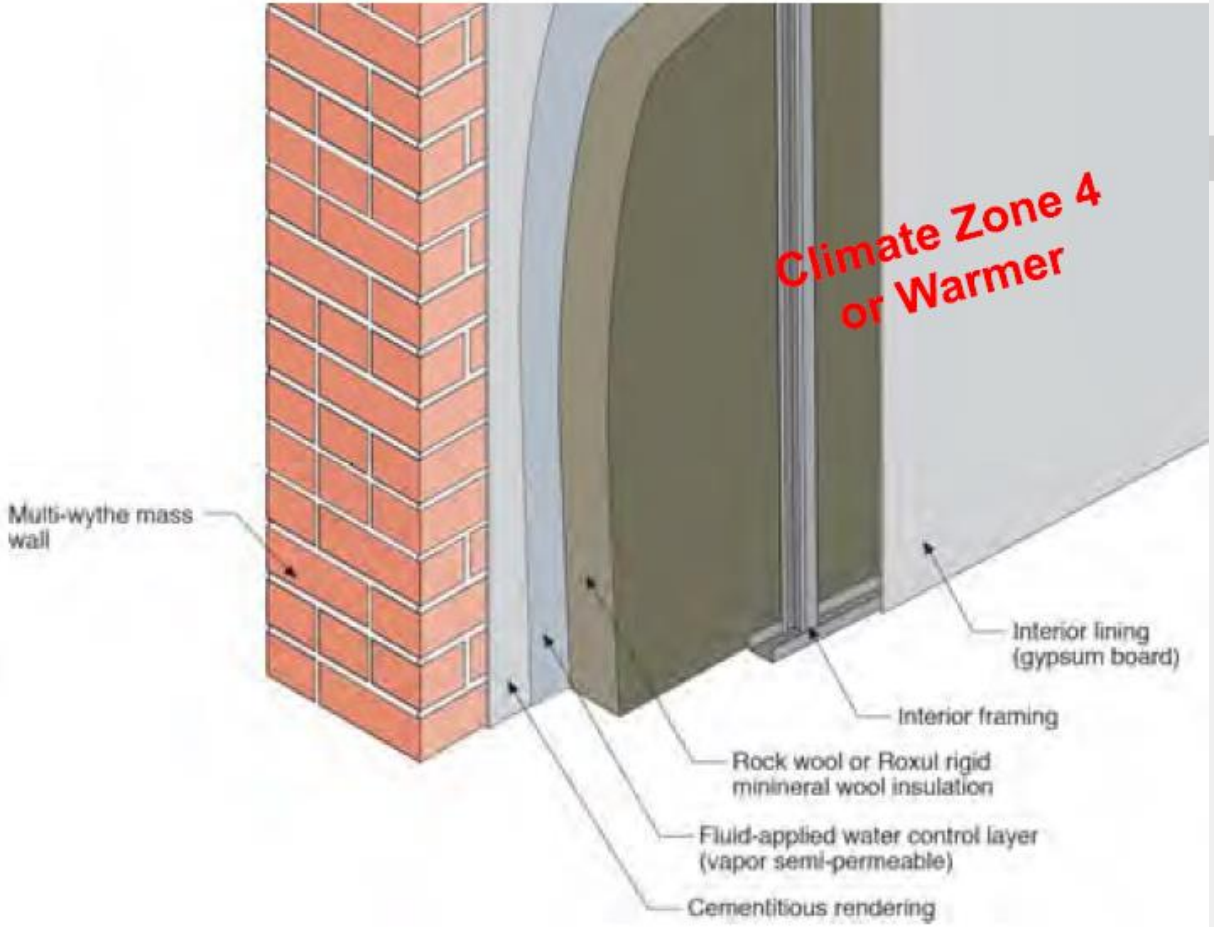


Masonry Interior Insulation Retrofit Assemblies

Closed-cell spray foam



Semi-rigid mineral fiber board



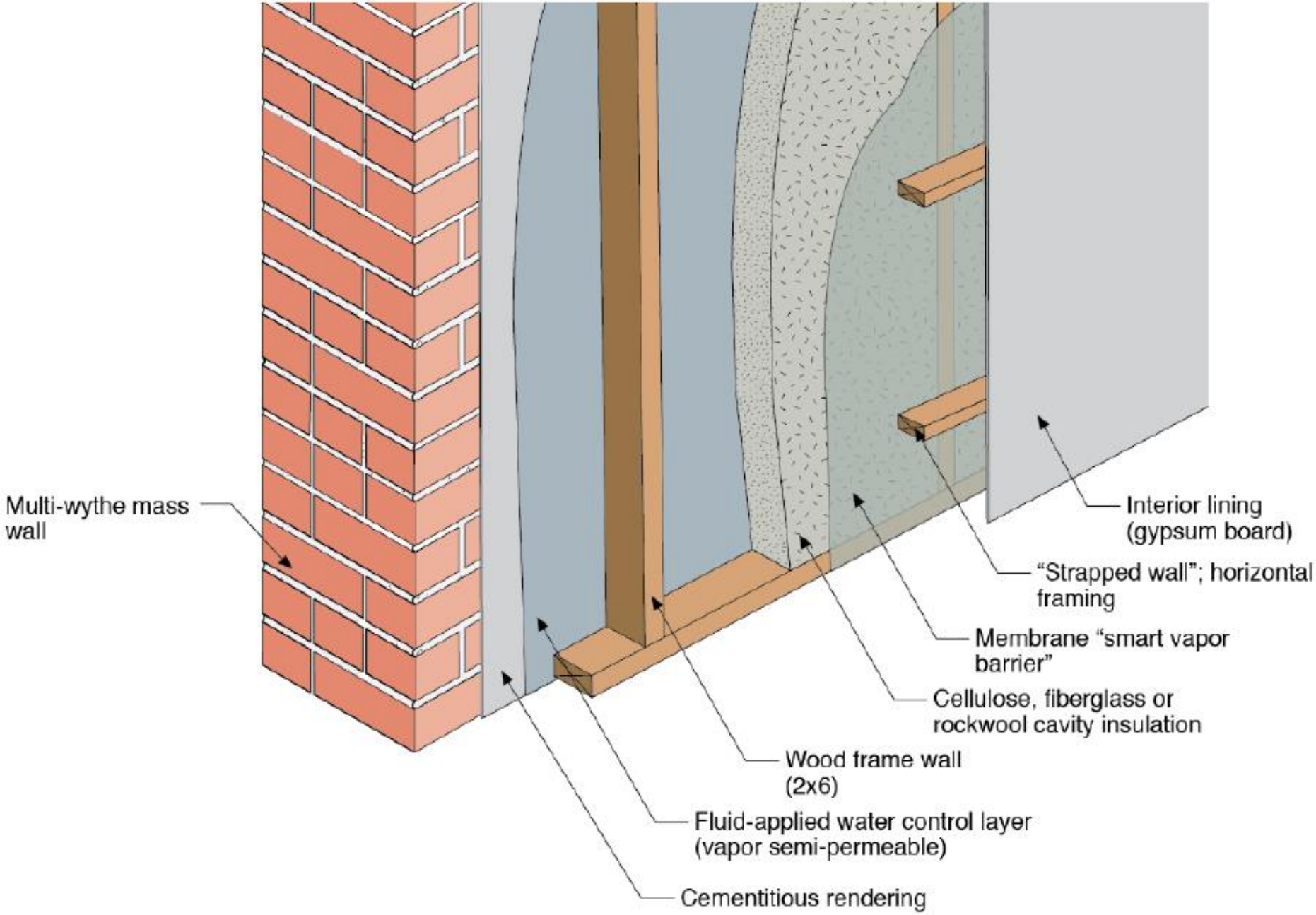


Figure 167: Stud wall with cavity insulation and service cavity (BSI-105)

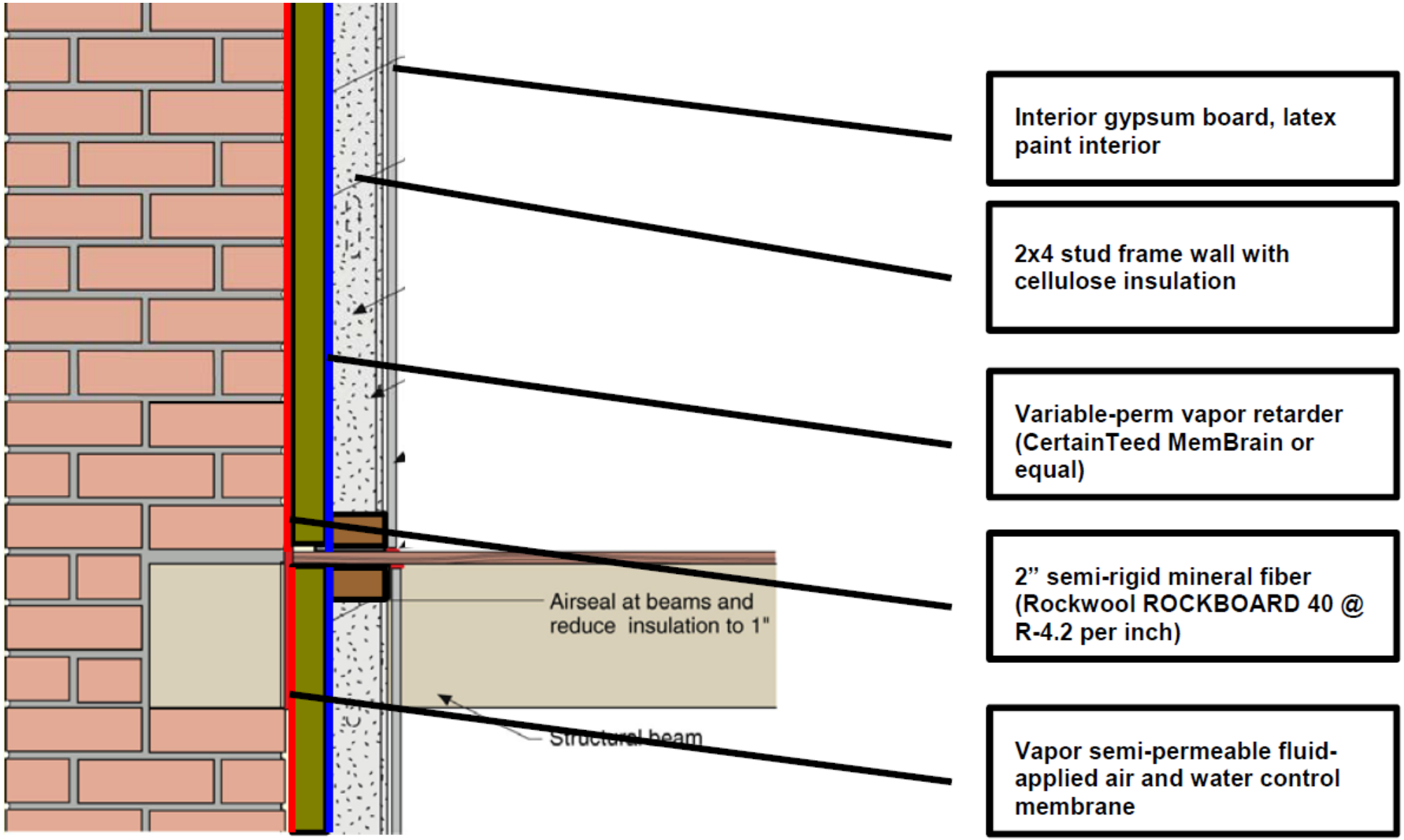


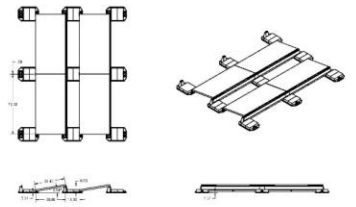
Figure 163: Conceptual drawing of mineral fiber and cellulose insulation option


GLAVEL
FOAM GLASS GRAVEL

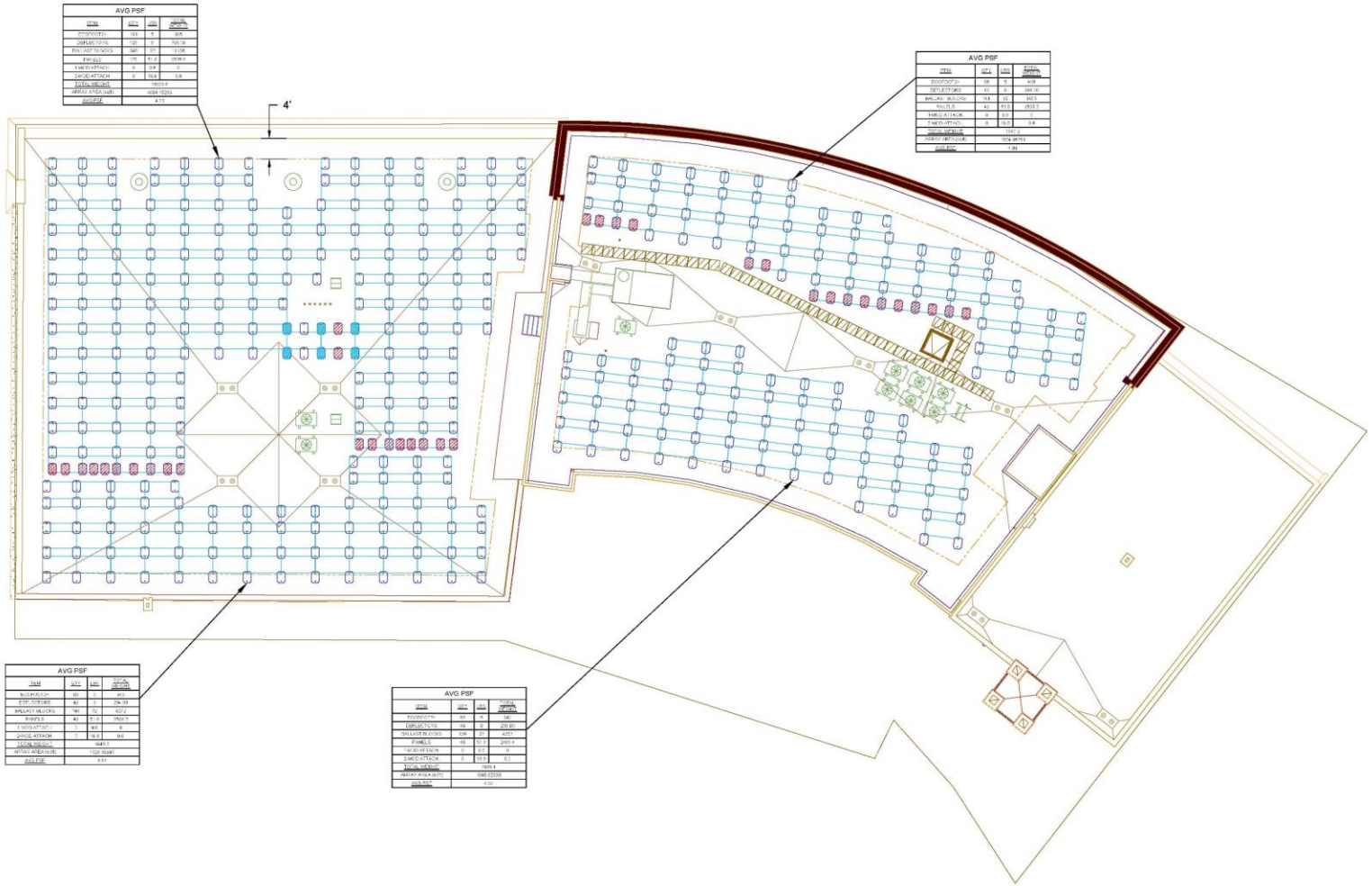
Harper Building - Storefront

Solar

100 KW Solar



HANWHA Q.CELLS 380W
ECOFOOT2+ LANDSCAPE ELEVATION/ISO VIEWS
SCALE: NTS UNITS: INCHES



MODULE NOTES

-PV MODULE SPECS (W): 380
-PV MODULE QUANTITY: 272
-SYSTEM POWER RATING (STC KWDC): 103.36
-ORIENTATION/TILT (DEGREE): LANDSCAPE/8.54°

BALLAST NOTES

-BALLAST BLOCK: 19"x9"x4" @ 32 LBS
ECOFOOT 2+ (BLOCK PER E2+):

BILL OF MATERIALS

NAME	QTY
ECOFOOT2+ (ECO-002_207)	398
UNIVERSAL CLAMP KIT (ES10466)	328
WIND DEFLECTOR (ECO-002_311C)	272
ECOFOOT MLPE BRACKET (ES10970)	0
38" BONDING JUMPER (ES10378)	46
ATTACHMENT	0
LOWER MID-SUPPORT (ES10498)	272
UPPER MID-SUPPORT (ES10502)	544
1 5/8" X 1 5/8" 12 GAUGE STRUT (10')	0
32 LBS BALLAST BLOCK	766

SITE NOTES

BASIC WIND SPEED (MPH)	120
EXPOSURE CATEGORY	B
GROUND SNOW LOAD (PSF)	60
OCCUPANCY CATEGORY	II
SEISMIC (Ss)	203
ROOF HEIGHT (FT)	56
PARAPET HEIGHT (IN)	0
ROOF SLOPE (DEG)	1.19
ROOFING TYPE	TPO MEMBRANE
ASCE7 VERSION	2010
BUILDING CODE	2012

DRAWING INDICATES PLACEMENT OF EQUIPMENT AND BALLAST. PLEASE REFER TO INSTALLATION MANUAL FOR FULL PRODUCT DETAILS. INSTALLER IS RESPONSIBLE FOR VERIFICATION OF SITE AND PROJECT SPECIFICS. DESIGN IS FINALIZED WHEN ACCOMPANIED BY STAMPED ENGINEERING REPORT.

NO.	REVISION	BY	DATE
A	REVISED LAYOUT	AC	2020-07-08

SHOP DRAWINGS NOT FOR CONSTRUCTION

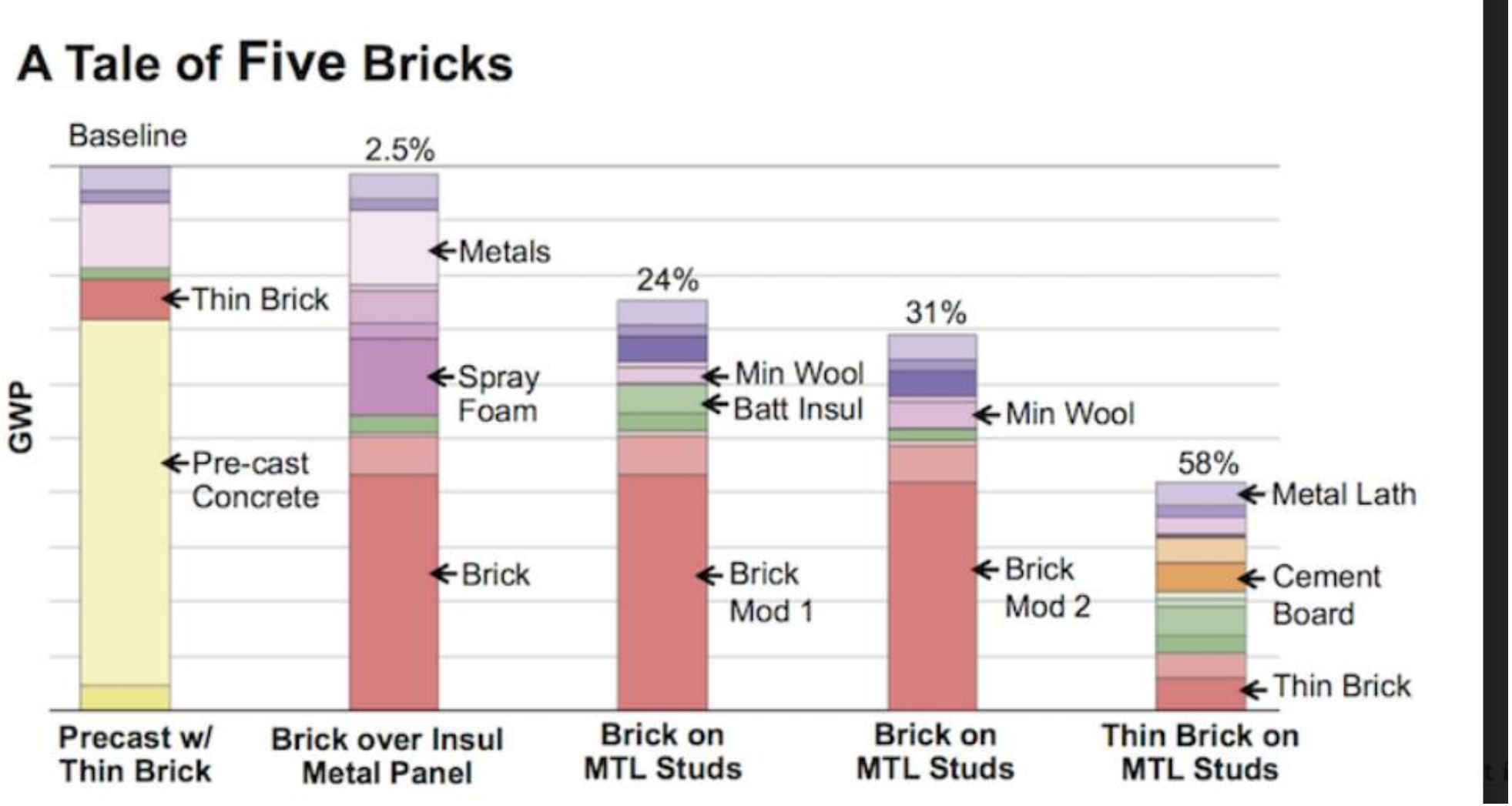
ECOLIBRIUM SOLAR
507 RICHLAND AVE., SUITE 301
ATHENS, OH, 45701

PRODUCED FOR: SUNBUG SOLAR

PROJECT NAME:
MORAN SQUARE
10 MAIN ST
FITCHBURG, MA 01420

Date: 2020-07-08	Sheet: S-1.0
Scale: 3/32" = 1'-0"	
Drawn By: AUDRA COCHRAN	

Material Reduction	Historic Building Reuse	Achieved
Energy	Passive House + Solar PV	Achieved
Concrete	Reduce Portland, Increase Fly Ash	Achieved
Siding on new building	FSC Wood, no brick/no fiber cement	National Park Service Requirement
Insulation	Cellulose, eco-fiberglass, mineral wool, Glavel	Wall section = cellulose and fiberglass. Demising walls (acoustic) = eco-fiberglass. Under slab = Glavel. Ceiling of parking garage (compromise!) – low HFO foam No XPS!!!
Dimensional framing	Wood instead of steel	???
Windows	Wood	Some
Flooring		No carpet! Reuse of some existing wood flooring. Forbo marmoleum. LVT (Interface says carbon neutral)
Countertops	Wilsonart and Formica	Greenguard and recycled content
Sheetrock	EcoSmart	???
Cabinets	FSC	No good options. Using wood.
Wood	FSC	No



Architect Brad Benke studied the impacts of brick façade systems and discovered that five functionally equivalent wall types had very different impacts. Thin brick on metal studs, shown at the far right, reduced embodied carbon 58% compared with a baseline wall system (thin brick with precast concrete).

Image: LMN Architects

https://www.buildinggreen.com/feature/urgency-embodied-carbon-and-what-you-can-do-about-it

Brick

Greenleaf (31% recycled content)

Thin Brick

Team Coordination and CoVid

Passive House - Yes

Low Carbon Materials - Huh? Where's the checklist, points, certification?